Remarks

The applicant thanks the examiner for allowing claims 1 through 21 and 25 through 27. In response to the examiner's rejection of claims 22 through 24 and 28 under 35 U.S.C. §103(a), the applicant makes the following arguments.

With respect to paragraph 2 of the office action, the subject matter of the claims was commonly owned at the time the inventions were made. Hence, the examiner's presumption was correct.

With respect to paragraph 3, the applicant believes the Examiner's rejection should be withdrawn. Blouin (US Patent No. 5,850,205) describes a method for real time correction of light output of a display system, using a sensor measuring a test display area. The results obtained in the test display area can be used to adjust the luminance or contrast in the main viewing area of the display system. However, the sensor is not adapted for suppressing light that is emitted outside a certain acceptance angle, as correctly indicated by the Examiner.

Yamakawa (US 2002/0018249) describes a sensor head for measuring the luminance distribution in different radial directions for a pixel in a pixel line of an LCD panel (abstract, lines 1 to 3). The sensor is suited for measuring emission angle dependency of light emission of pixels in a display panel such as an LCD panel, typically in a situation whereby only the pixel(s) to be measured is (are) active and not in a real-time measurement. The latter is indicated for example by the method describing activation of all pixels in turn and scanning the light by the linear image sensors each time (see e.g. §36) or by the fact that the system is used during an inspection/evaluation process (see e.g. §63). Furthermore, the system described would not allow to suppress light emitted outside the acceptance angle for real-time measurement in a representative area.

In the present patent application, a system is described wherein, due to optical attenuation

in a light guide, light is suppressed if it is emitted outside a pre-determined acceptance angle with reference to the normal direction to the display area (see e.g. Fig. 10A and Fig. 10B of the present application). This suppression is carried out for all pixels in the representative part of the display which is used for controlling the emission characteristics. Typically this is a plurality of active pixels in an area of the display (see e.g. page 5 lines 13 –20). Using an area with a plurality of pixels allows to obtain a representative characterization for the whole display.

Obtaining emission characteristics for a representative part of the display in real time whereby mainly light emitted within a certain acceptance angle is used, can not be obtained by combining the teachings of US 5,850,205 and US 2002/0018249.

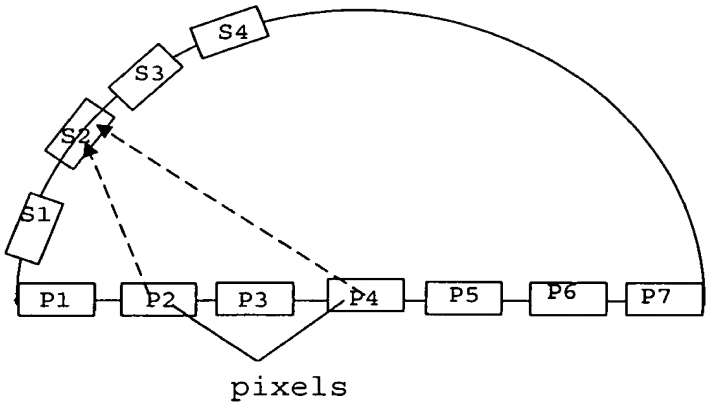
If e.g. the sensor head of example 1 of US 2002/0018249 would be used in real-time measurements as in the present invention, with a representative area comprising a plurality of pixels in two directions, then light emitted from different pixels in the representative area under different emission angles will contribute to the signal captured by a certain light sensor.

This is illustrated in figure 1 hereinafter, showing a cross-section in a plane defined by axes 1C – 1B in Fig. 1B of US 2002/0018249. If a number of pixels is active at the time of measurement, which is the case if characterization is done in real-time, each pixel will contribute with a large signal to the sensor right above it (capturing light under 0°). This means that pixel P3 will contribute with a large signal to sensor S4, and with a smaller signal to sensor S3, while at the same time pixel P2 will contribute with a large signal to sensor S3 and with a smaller signal to sensor S4. However, no suppression of emission from large acceptance angles can be obtained with this system, e.g. suppression of light emitted from pixel P4 and measured by sensors S1 to S3.

Furthermore, the method of the present invention also suppresses ambient light which would fall in on and be reflected by a pixel in the representative area (page 10 line 34 – page 11 line 6 of the present patent application). This cannot be obtained by the sensor of figure 1

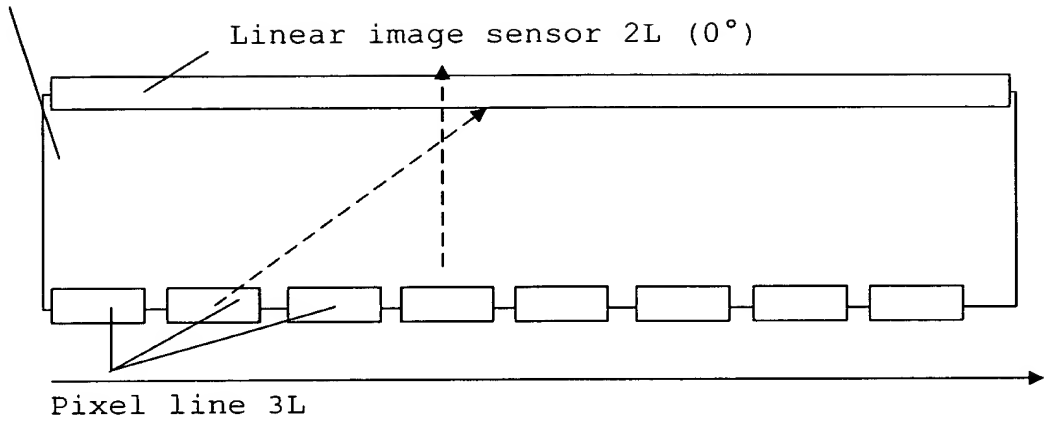
hereinbelow, as any of the sensor strips S1, ..., S4, ... will measure that part of the ambient light entering the volume above the representative area.

figure 1



If e.g. the sensor head of examples 2 to 4 of US 2002/0018249 is used in real-time measurements, i.e. covering a single pixel line as representative area, then suppression of light emitted outside the acceptance angle may be obtained in the plane of figure 1 above, i.e. for example by attenuating the measurements by sensors Si outside the acceptance angle. However, in a perpendicular direction, neighboring pixels still contribute light emitted under different angles to a certain sensor element. This is illustrated in figure 2, showing a 1C – 1A cross section of the system shown in Fig. 1B of US 2002/0018249 A1.

figure 2



Therefore, combining the above mentioned teaching of US 2002/0018249 with the general real time measuring detector described in US 5,850,205 does not lead to a system that, for a representative area of the display, suppresses light emitted under angles larger than an acceptance angle of 30°.

In example 5 of US 2002/0018249, a sensor head is described wherein the spherical distribution of the emitted light can be determined and thus controlled, i.e. wherein the emission angle is controlled in all directions. Nevertheless, this system is only suitable for a single pixel positioned in the centre of the imaginary sphere whereon detection is performed, and not for a plurality of pixels representing a representative part of the display. The method described in US 2002/0018249 therefore needs to select single pixels to be measured and it does not allow to obtain information of a plurality of pixels in real-time application. A single pixel is not considered to be a representative area.

From the above, it is clear that combination of the method for measuring using a sensor head described in US 2002/0018249 with the real-time measurement method described in US 5,850,205 does not allow determination of the emission characteristics using a representative

part of the display and using mainly light emitted within a certain acceptance angle, as described in claim 22.

Therefore, the combination of US 5,850,205 and US 2002/0018249 A1 does not render 22 obvious.

Dependent claims 23, 24 and 28 are novel and inventive by virtue of their dependency on claim 22.

With respect to paragraph 4 and 5 of the office action, it is noted that claims 1 to 21 and 25 to 27 are allowable.

Applicant wishes to point out that in fact the characterizing feature of claim 1 and the characterizing feature of claim 22 correspond to each other: "the acceptance angle of the optical aperture of the optical sensor unit being such that at least 50% of the light received by the light sensor comes from light travelling within 15° of the optical axis of the light sensor", corresponds to "the amount of light emitted or reflected from the display area at a subtended angle of 30° to the amount of light emitted or reflected from the display area at a subtended acceptance angle of greater than 30° is at least 1:1". Thus, claim 22 is allowable.

In view of the foregoing arguments, the applicants believes claims 22 through 24 and 28 are allowable, and respectfully requests the examiner's rejection be withdrawn.

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Respectfully submitted,

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